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(54) Title: DYNAMIC AD TARGETING BY AN INTERNET SERVER (54) Titre: CIBLAGE DYNAMIQUE D'ANNONCES PUBLICITAIRES PAR UN SERVEUR INTERNET (57) Abstract <p>In accordance with the present invention, there is provided an ad server application that selects advertisements to be viewed by users of an online service. The ad server application receives information about the users and information about the desired audience for the advertisements. The ad server application performs a best-fit match between the users and the advertisements. The selected advertisements are then displayed to users in an order selected by the ad server application, and based upon the performance of the advertisements, the ad server application refines the best-fit matches and the display order for the users.</p> (57) Abrégé <p>Dans cette invention, une application de serveur publicitaire sélectionne les annonces publicitaires devant être vues par les utilisateurs d'un service en ligne. Le serveur publicitaire reçoit des informations sur les utilisateurs et des informations sur le public souhaité attirer par ces publicités. L'application du serveur publicitaire exécute la meilleure correspondance entre les utilisateurs et les annonces publicitaires. Les annonces publicitaires sélectionnées sont alors affichées à l'attention des utilisateurs dans un ordre sélectionné par l'application du serveur publicitaire, et, sur la base des performances de ces annonces publicitaires, l'application du serveur publicitaire améliore les meilleures correspondances et l'ordre d'affichage pour les utilisateurs.</p>		

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(54) Title: DYNAMIC AD TARGETING BY AN INTERNET SERVER			
<pre>graph LR LD[Local Device 100] --- DAN[Data Access Network 120] DAN --- WS[Web Server 150] DAN --- OSP[OSP Server 130]</pre>			
(57) Abstract			
<p>In accordance with the present invention, there is provided an ad server application that selects advertisements to be viewed by users of an online service. The ad server application receives information about the users and information about the desired audience for the advertisements. The ad server application performs a best-fit match between the users and the advertisements. The selected advertisements are then displayed to users in an order selected by the ad server application, and based upon the performance of the advertisements, the ad server application refines the best-fit matches and the display order for the users.</p>			

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Description

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DYNAMIC AD TARGETING BY AN INTERNET SERVER

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BACKGROUND OF THE INVENTION

1. *Field Of The Invention*

The present invention relates to the selection of advertisements and display of advertisements to a user of an online service.

2. *Description Of Related Art*

Online services today offer a variety of services to their users. Users may access news, weather, financial, sports, and entertainment services, participate in and retrieve information from online discussion groups, and send and receive email. A user of an online service typically accesses the service using specialized communication software (i.e., client application or client software) that establishes and manages a connection from the user's computer (or client) to the online service provider's host computers (or servers) and facilitates the user's interactions with the service.

In addition to managing the connection, there is provided software to display pages or screens relating to retrieved content according to views or presentations specific to the online service. This software may be integrated with the client application. The functionality of the content and the user interface (i.e., icons, dialog boxes, menus, etc.) for interacting with the content are typically dictated by various standards.

Interactions between the user's computer and the online service are facilitated by a variety of software protocols (i.e., communication conventions, rules and structures),

5 including application level protocols, for managing the transfer of data across the network
and to the client application on the user's computer. A protocol may be proprietary or
10 exclusive to an online service such that only client software from the online service provider
may be used to communicate with the server software. For example, an online service
provider that supports electronic mail, discussion groups, chat groups, news services, etc.
15 may define and use specific protocols for each type of service so that appropriate information
is exchanged between the participants (i.e., clients and servers). Each application-specific
protocol may be based on a common, underlying protocol.

20 The Internet and World Wide Web ("Web"), comprised of a vast array of international
computer networks, may provide online service users with considerable information resources
and other content. Typically, this content is accessed using a web browser, such as Microsoft
Internet Explorer or Netscape Navigator, capable of understanding the HyperText Markup
25 Language (HTML) used to create the documents found on the Web and the HyperText
Transfer Protocol (HTTP) used to navigate the Web. Email and Usenet discussion groups are
typically accessed through companion software to the browser. Although web browsers
30 typically have varying levels of functionality or sophistication, retrieved content is displayed
in content pages according to views or presentations specific to the web document currently
presented by the web browser. Typically, the views and presentations are different than those
provided by the communication software from the online service provider because the web
35 browser is, in fact, a separate client application displaying web documents containing
presentation directives.

40 When using a browser, the browser issues HTTP messages to request web pages. A
requested web page is typically identified using its URL – uniform resource locator. The
URL is a reference (or address) to a resource available on a TCP/IP network such as the
Internet. A URL is composed of a character string, and may have a number of parts. These
45 parts include a top level domain name, second level domain name, directory name, and file
name. URLs may identify a file located on a web server. URLs may also point to other
resources on the network such as database queries and command output. The determination
and use of URLs is well known in the art and is not discussed further herein.
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5 In some portions of this disclosure, the term "resource locator" is used. The term is
defined as a string or code which uniquely identifies a resource on a network. Thus, the URL
10 is a species of resource locator.

There are a number of types of online service providers (OSPs). Online services may
serve the general public or may serve a limited class of individuals. Some public OSFs
15 utilize proprietary networks; America Online and @Home are examples. Other public OSFs
use the public networks, and most Internet Service Providers (ISPs) are an example. OSFs
often provide Internet access. Internet access is the primary service provided by some OSFs,
20 most notably ISPs.

Users typically connect to an OSP using a computer with a communications device
such as an analog modem, an Ethernet adapter, DSL adapter or cable modem. Such
25 connections may be analog or digital, dial-up or constantly-connected. Subscribers typically
pay a fee for their subscriptions to OSFs. These fees typically are in the form of a sign-up
fee, plus online charges which are fixed (i.e., unlimited monthly access for a fixed fee) or
based upon the amount of time the user is connected to the online service. The fees generally
30 increase with bandwidth.

Some online service providers have derived revenue by displaying advertisements for
third parties (hereinafter, "advertisements") to users. For example, when a user accesses a
35 web page on the Web, an advertisement may be displayed to the user as part of the web page.
Advertisements are also shown to users of some proprietary online services. Typically in
such systems, each user accessing a certain screen or site is shown the same advertisement.
40 Sophisticated systems have the capability to change the advertisement after a certain period of
time.

Some attempts have been made to provide advertising-supported online services,
45 including Internet access, on a free or heavily discounted basis. Typically, these online
services required the user to use a special client application for connecting to the online
service. The client application typically causes an advertising window to be displayed on the
user's display. This advertising window remains visible and on top of other windows
50 throughout the entire online session. The client application receives advertisements one at a

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time from the online service provider, and the client application displays the advertisements in the advertising window. It is unknown to the inventors, however, whether the transmission of advertisements from the online service provider to the client application is initiated by the online service provider or the client application, how the online service determines which advertisements to send to the users, and whether such typical client applications do anything more than open the communications link with the online service and display advertisements.

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In one advertising based Internet service called Bigger.net, the client application periodically requested new advertisements from an ad server. A host computer monitored the time between such requests and terminated the connection if a preset period of time was exceeded. Bigger.net also had the ability to monitor network activity, though it is unclear how this was done.

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Other advertising-supported online services have included: CyberFreeway, which used a client application developed by HyperNet, Inc. of Tokyo, Japan; Juno Online, which provided free email; Tritium and Freewwwweb.

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Advertisers find it desirable to target advertisements to relevant potential customers. For example, an advertiser of stockings would prefer to target women rather than men with its advertising. A Boston restaurant would prefer to target residents of Boston and business travelers rather than children living in San Francisco. Moreover, advertisers prefer to pay for advertising based upon the number of relevant consumers who are actually exposed to the advertisement. For typical online systems and networks, including the Web, it is often difficult for an advertiser to precisely determine whether its advertisements were actually viewed by a user and for how long, and whether the advertisement induced a response. Accordingly, there exists a need for a targeted advertisement system that also can provide information as to the characteristics of those who were exposed to each advertisement, for how long the user was exposed, and at what times.

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It is believed that the prior art advertising-supported online services did not have the ability to target advertisements. Furthermore, their client applications are believed to have been limited in capabilities.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided an ad server application that selects advertisements to be viewed by users of an online service. The ad server application receives information about the users and information about the desired audience for the advertisements. The ad server application performs a best-fit match between the users and the advertisements. The selected advertisements are then displayed to users in an order selected by the ad server application, and based upon the performance of the advertisements, the ad server application refines the best-fit matches and the display order for the users.

In certain circumstances, the ad server automatically transmits certain advertisements for immediate display in real time. In one such circumstance, the ad server determines whether any advertisements are exhibiting a good response from users of a given demographic category. If the advertisement is receiving a good response from users of a given demographic category, then the ad server automatically causes the advertisement to be displayed to users of a similar demographic category. Advertisements that are exhibiting a poor performance with users may also be given special attention. Such advertisements are increased in rotation or prominently displayed to the user in an attempt to generate user response to the advertisement.

Still further objects and advantages attaching to the system and to its use and operation will be apparent to those skilled in the art from the following particular description.

DESCRIPTION OF THE DRAWINGS

Further objects of this invention, together with additional features contributing thereto and advantages accruing therefrom, will be apparent from the following description of a preferred embodiment of the present invention which is shown in the accompanying drawings with like reference numerals indicating corresponding parts throughout and which is to be read in conjunction with the following drawings, wherein:

Figure 1 is a first block diagram of a network data distribution system in accordance with the invention.

Figure 2 is a second block diagram of a network data distribution system in accordance with the present invention.

Figure 3 is a representation of a display of a local device having a client window and a browser window.

Figure 4 is a flow chart of a method of monitoring web browsing by a user in accordance with the invention.

Figure 5 is a flow chart of a method of displaying advertisements to a user of an online service in accordance with the invention.

Figure 6 is a flow chart of a method of assembling a list of targeted advertisements for a user of an online service in accordance with the invention.

Figure 7 is a flow chart of a method of optimizing advertisement targeting criteria in accordance with the invention.

Figure 8 is a flow chart of a method of dynamically re-targeting advertisements to users of online service in accordance with the invention.

These and additional embodiments of the invention may now be better understood by turning to the following detailed description wherein an illustrated embodiment is described.

DETAILED DESCRIPTION OF THE INVENTION

Throughout this description, the preferred embodiment and examples shown should be considered as exemplars, rather than limitations on the apparatus and methods of the present invention.

The System of the Invention

The system of the invention enables data, such as advertisements, to be sent to users based upon: the user's geographic location; the user's interactive data; the user's network usage data; the user's personal profile information; the scheduling requirements of the data to be sent; and the demographic requirements of the data to be sent. As used herein, the term "demographic" is used to refer to various characteristics that define the user. A user's demographic profile may be divided into various categories including, but not limited to, geographic location, age, occupation, gender, marital status, and psychological characteristics such as interests and hobbies.

Referring now to Figure 1, there is shown a block diagram of a network data distribution system in accordance with the invention in conjunction with a source of web pages. Figure 1 includes a local device 100, a data access network 120, an OSP server 130 and a web server 150. The local device 100, the data access network 120 and the OSP server 130 comprise the network data distribution system. The local device 100 is provided online service to the network data distribution system under control of the OSP server 130. An online service provider controls the OSP server 130.

The local device 100 preferably comprises a client computer that is configured to access the OSP server 130 via the local access network 120. The client computer may be, for example, a PC running a Microsoft Windows operating system. The local device 100 preferably includes an output device, such as display 101, and an input device, such as keyboard 102 and / or pointing device 103 (e.g., mouse, track ball, light pen, or data glove). The local device 100 may also be, for example, an Internet appliance, network computer (NC), or an appropriately Internet-enabled device such as a portable digital assistant (PDA), mobile phone, refrigerator, etc. The particular type of device of the local device 100 is not

5 considered to be important so long as the local device 100 can provide some measure of individual user interactivity with an online service.

10 The data access network 120 provides lower layer network support for the local device 100 to interact with online service, including the OSP server 130 and the web server 150. The data access network 120 preferably comprises a common or private bi-directional telecommunications network (c.g., a public switched telephone network (PSTN), a cable-based telecommunication network, a LAN, a WAN, a wireless network), coupled with or
15 overlaid by a TCP/IP network (e.g., the Internet or an intranet).

20 The web server 150 may be of the type known in the art and has the ability to serve web pages to the local device 100, as requested in the manner known in the art. It should be appreciated that the web server 150 is representative of any source of web pages available to the local device 100. Thus, for example, the web server 150 could be accessible from the
25 Internet, or it could be a part of an intranet and represents any number of web servers.

The OSP server 130 preferably is a computer system, such as a server computer. Alternatively, the OSP server 130 may be considered to represent a number of physical
30 devices which as a group provide the indicated network services. For example, the OSP server 130 could include a dedicated advertisement server that processes advertisement-related data. The OSP server 130 acts as a recipient of certain information transmitted by the local device 100, as described further below. The OSP server 130 preferably also transmits
35 certain data to the local device 100 as described further below.

Referring now to Figure 2, there is shown a block diagram of a network data
40 distribution system of an online service in accordance with the present invention. The system comprises a client application 110, the data access network 120, the OSP server 130 and data stores 140a-g (collectively, 140). A browser application 160 is also shown. A "browser application" is software that provides interactive utilization of hypertext objects located on a
45 network, such as web pages on the Internet. As used herein, "browser application" also includes most email clients and ftp clients. The client application 110 is a program operative on local device 100, and preferably an independent application program or a DLL. The client
50 application 110 preferably retrieves certain network data, displays certain network data,

5 transmits geographic location data, transmits interactive user data, transmits network usage
data and transmits personal profile information as described below. The client application
10 110 preferably also sets up and provides access to the online service. The data stores 140
store and provide this geographic information data 140d, network usage data 140a, interactive
usage data 140b, personal profile information 140g, data to be sent 140e, schedule for
15 transmitting data 140f and demographics for transmitting data 140c.

The browser application 160, such as Microsoft Internet Explorer or Netscape
Navigator is preferably installed on the local device 100. When the local device 100 is
20 connected to the web server 150 through the data access network 120, the user of the local
device browses the web server 150 from the local device 100 using the browser application.
The browser application itself need not be stored on the local device 100. The important
aspect is that the user, from the local device 100, can exercise control over what web pages
25 are requested and thus displayed by the local device 100.

Each time a user uses the local device 100 to connect to the online service, the client
application 110 and the OSP server 130 establish a session. In this session, the client
30 application 110 transmits certain information regarding the user of the local device 100 and
his use of the local device 100 while connected to the online service. The OSP server 130, on
the other hand, uses the information from the client application 100 to determine information
which should be sent to the client application 110. Preferably, the information from the client
35 application 110 is used by the OSP server 130 to select advertisements which the local device
100 should display. The client application 110 then causes these advertisements to be
displayed on the local device's output device 101.

40 The information from the client application 110 regarding the user preferably includes
geographic data and personal profile information. Geographic data indicating the user's
current location preferably is sent from the client application 110 to the OSP server 130,
45 which then stores the geographic data in the data store 140d. This geographic data can be
something simple, like a phone number. The user preferably provides personal profile
information on a periodic basis which is stored in the data store 140g and used by the OSP
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5 server 130. This information consists of (but is not limited to) things such as: age, sex, marriage status, home address and personal interests.

10 The information regarding the user's use of the local device 100 includes email usage, web usage and advertisement click-throughs. The user's interactions and feedback with the web server 150 provided through the browser application 160 are preferably captured by the client application 110, analyzed by the OSP server 130 and stored in the data store 140b.
15 This includes the user's feedback and responses to the data delivered to the browser application 160. The user's activities on the web server 150 provided through the browser application 160 are preferably captured by the client application 110, analyzed by the OSP server 130 and stored in the data store 140a. This includes the type of network data the user requests and accesses. This data is preferably summarized and classified into multiple demographic profiles.

25 The data to be sent to users preferably has scheduling requirements that dictate when it should be sent. These scheduling requirements include (but are not limited to): frequency, maximum number of times to send to an individual, minimum number of times to send to an individual, time of day to send, and first and last days to send. The data to be sent to users can have demographic requirements that dictate to whom it should be sent. These include (but are not limited to): personal profile, interactive data, network usage information and geographic location.
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35 Referring now to Figure 3, there is shown the display 101 having a client window 200 and a browser window 300. The client window 200 is generated and controlled by the client application 110. The browser window 300 is generated and controlled by the browser application 160, here Microsoft Internet Explorer. The browser window 300 is familiar to those skilled in the art, so the particulars are not described further herein. Further information regarding the use of most browser applications and their technical specifications is abundantly available.
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45 The client window 200 includes a title bar 230, an advertising pane 210, a number of operational icons 205, 215, 220, 240, 250 on the title bar 230, and a number of button bar icons 260, 265, 270, 275 on a button bar 280. The title bar 230 preferably identifies the name
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5 of the OSP. The advertising pane 210 is a space in which the client application 110 displays
advertisements. The client window 200 and the advertising pane 210 are shown having a
10 conventional rectangular shape. However, the client window 200 and the advertising pane
210 may define any of a wide variety of regular or irregular shapes.

15 The button bar icons 260, 265, 270, 275 preferably provide one-click access to Web
pages and / or menus that might be useful to the user. The online service provider can sell the
button bar icons to third parties as an additional revenue source. These icons 260, 265, 270,
275 are associated with particular URLs. In the illustrated example, the icon 260 is
20 associated with a start page. The icon 265 is associated with an online shopping mall page.
The icon 270 is associated with an online technical support page from the online service
provider, and the icon 275 is associated with an online search engine page. By clicking on
any of these icons 260, 265, 270, 275, the client application 110 causes the browser
25 application 160 to load the Web page having the URL associated with the selected icon.

30 The operational icons 205, 215, 240, 250, 280 on the title bar 230 preferably provide
one-click access to operational features of the client application 110. As explained below, the
client application 110 maintains records of the advertisements that have been displayed. The
cycle back icon 205 allows the user to review advertisements which were previously
35 displayed by the client application 110, in the reverse order in which the advertisements were
displayed. If the user has cycled back through advertisements, the cycle forward icon 215
allows the user to review advertisements in the order in which the advertisements were
displayed by the client application 110. The search icon 240 provides convenient access to
40 online searching facilities. The close icon 250 causes the client window 200 to close, and
thus also causes the session with the online service to terminate.

45 The client application 110 preferably provides access to a menu of additional menu
items and functions. The menu preferably provides alternative and enhanced access to the
features associated with the button bar icons 260, 265, 270, 275 and the other operational
icons 205, 215, 240, 250. In addition, the client application 110 preferably provides the user
50 with the ability to hide or show the title bar 230 and / or the button bar 280. The client
application 110 preferably also allows the user to access and edit his profile. The user is

preferably also provided with the option of positioning the client window 200 at any of a number of predefined positions, such as top left corner of the display 101, top right corner, bottom left corner, or bottom right corner.

The browser window 300 includes a display pane 310, an address bar 320 and a title bar 330. The display pane 310 is a region of the browser window 300 wherein the browser application causes web pages received by the browser application to be displayed. The address bar 320 is another region of the browser window 300 and the browser application displays URLs in the address bar 320 corresponding to the web page currently displayed in the display pane 310. The user can also enter a URL into the address bar 320, and the browser application will attempt to load the web page or other object to which the entered URL points. The primary feature of the title bar 330 is that it displays the title of the browser application. Another feature of most browsers is that the title bar 330 displays the title of the web page then displayed in the display pane 310.

The client window 200 is displayed on top of the browser window 300. Preferably, the client window 200 remains visible and on top of all other windows so long as the communication channel to the OSP server 130 is open. The client application 110 preferably can control the location of the client window 200 on the display 101. For example, the client application 110 preferably allows the user to select one of several predefined locations for the client window 200, such as lower left corner, upper right corner, etc. Some operating systems such as Microsoft Windows permit windows to be moved to the edge of the display 101 so that only a small portion of the window is visible. The client application 110 preferably can also prevent the client window 200 from being moved off of the visible area of the display 101. When the user attempts to hide all or a part of the client window 200, the client application preferably moves the client window 200 to a fully visible area of the display 101.

The Methods of the Invention

Referring now to Figure 4, there is shown a flow chart of a method of distributing data in a network in accordance with the invention. The components 110, 120, 130, 140 work together to deliver data that meets the geographic and demographic criteria.

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After the method begins (step 405), the user preferably uses the client application 110 to connect to the data access network 120, and then the OSP server 130 (step 410). The particular manner of the connection depends on the network infrastructure underlying the connections. The important aspect of this step 410 is that a communications channel is established between the client application 110 and the OSP server 130. By "communications channel," it is meant a logical path for data transmission. The OSP server 130 preferably acts as a gatekeeper to the online services. Only after the OSP server 130 has authorized access can the local device 100 access the web server 150 and the other resources of the online service.

The communication channel may be of two varieties – dial-up or constant-connection. In a dial-up communication channel, the connection to the online service becomes available only after the local device 100 creates a physical link to the online network and then a logical link to the online network. For example, the local device 100 has a -up communication channel if the local device 100 has a modem and connects through tone dialing to the online service using the PSTN. In a constant-connection communication channel, the connection to the online service is always available to the local device 100, and the local device need only create a logical link to the online network. For example, the local device 100 has a constant-connection communication channel when the local device 100 has a cable modem and connects to the online service using a cable service.

If this is the first time the user has connected (step 415), then the OSP server 130 preferably requires the user to use the local device 100 to submit personal profile information (step 420). Preferably, the OSP server 130 periodically will request (step 425) that the client application 110 have the user update this profile (step 430).

Each time the local device 100 connects to the OSP server 130, the OSP server 130 preferably obtains data indicating the local device's current geographic location (step 435). This geographic information is preferably derived from a local access phone number used by the client application 110 to connect to the data access network 120, and the client application 110 transmits its local access phone number to the OSP server 130 for geographic determination purposes.

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Once connected, a number of processes are preferably started (step 440). In one of these processes, whenever the user interacts with data received on the client application 110, the client application 110 sends feedback information respecting this interaction to the OSP server 130. The OSP server 130 then summarizes and classifies the feedback information into demographic profiles stored in the data store 140.

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In another of these processes, whenever a user uses the browser application 160 to request or access data from the web server 150, the client application 110 sends feedback information respecting these requests and data accesses to the OSP server 130. The OSP server 130 then summarizes and classifies this feedback information into the demographic profiles in the data store 140.

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In another of these processes, while a user's local device 100 is connected to the web server 150, the OSP server 130 determines which targeted data needs to be sent to the client application 110 and then transmits this targeted data to the client application 110. The OSP server 130 accomplishes this by:

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examining the scheduling requirements to determine which data needs to be sent;

examining the demographic requirements of the data to determine to which demographic profiles the data needs to be sent;

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selecting the users who are currently connected that meet the demographic requirements of the data; and

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sending the data to the selected users.

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As mentioned, one of the processes relates to the display of data, and particularly advertisements, in the client window 200. The process preferably operates in conjunction with a table database stored within the data stores 140. The following description is one way of embodying the database, and others are within the scope of the invention.

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A User Information table holds information collected about the user, including the user's demographic categories, such as age, gender, occupation, geographic location,

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interests, and hobbies. The OSP server 130 preferably creates the User Information records for each user when the user submits a personal profile during the first-time connection to the data access network 120. Additionally, the OSP server 130 preferably regular updates the User Information table in response to monitored user activities on the web server 150, including the type of network data the user requests and accesses. The User Information table preferably also holds the delivery preferences for each user, including the days and times at which to deliver advertisements, and the maximum number of advertisements to deliver in a given time period.

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A set of Advertiser tables includes information about each organization that desires to have content-area advertisements transmitted to users. A Product table preferably exists for each product that the advertiser wishes to promote. Each Product table is preferably associated with at least one Advertisement table that includes information about the advertisement to be displayed to the user, including criteria fields relating to the demographic category or categories to which the advertisement is sent. The target criteria may be divided into several categories, such as geographic location, age, gender, marital status, hobbies, occupation, etc. The target criteria fields preferably each have corresponding fields in the User Information table. The Advertisement table may also include preferred times of day at which the advertisement is displayed to users.

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There is also an Ad Performance table associated with each Advertisement table containing data relating to the performance of the advertisement. The Ad Performance table preferably contains data relating to usage and response to the advertisement, such as which user demographic categories have clicked-through the advertisement, the times of day of the click-throughs, the number of click-throughs by each demographic, types of merchandise purchased, purchase volume, questionnaire or survey responses, commerce transaction information, search data, browse data, shopping cart activities, and other information gathered or collected following the display of an advertisement.. This type of information may be obtained by monitoring usage by each user, as described in the above-referenced related applications.

5 The OSP server considers the advertisements for transmission and display to the user once the advertiser has established advertising records.

10 Referring now to Figure 5, there is shown a flow chart of a method of displaying advertisements to a user of an online service in accordance with the invention. This method generally involves the display of advertisements that are dynamically targeted toward the user
15 based upon the user's demographic profile, geographic profile, and usage history.

After the method begins (step 500), the client application is activated (step 510). The client application 110 may be installed during manufacture of the local device 100, during use
20 of the local device 100 at the instigation of the user, or may occur automatically as a consequence of other processes. Furthermore, the client application 110 may be activated either manually or automatically. Although at least some aspects of the client application 110 should be operable from the local device 100, the client application 110 need not be stored on
25 the local device 100 and can be run from a remote location.

In the next step (step 520), the client application 110 establishes a communication
30 channel to the online service. With the communication channel established, the client application 110 receives an advertisement play list from the OSP server 130 (step 530). The play list comprises one or more ad objects. The ad objects are preferably data constructs which each include a resource locator of an advertisement to be displayed, a resource locator to be accessed if the user clicks on (or otherwise selects) the advertisement when displayed in
35 the ad pane 210, and a number of attributes for the display of the advertisement. The play list preferably specifies an order in which the advertisements identified in the play list are to be displayed. Additionally, the play list specifies the amount of time that each advertisement is displayed.

Typically, advertisements in the online industry are associated with a resource locator,
45 and more typically with a URL. As is well known, when a user uses his pointing device 103 to click on an online advertisement in a browser's window such as browser window 300, the browser application loads the resource at the associated URL. This is commonly known as "click-through." In accordance with the invention, if during the display of an advertisement
50 in the ad pane 210, the user clicks-through on the advertisement, then the client application

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110 causes the resource locator associated with the advertisement to be loaded by the browser
application 160. If the browser application 160 is not open at the time, then the browser
10 application is first opened and then pointed to the resource locator associated with the
advertisement. If the resource locator is not for a web page, the client application 110 or
some other software in the local device 100 preferably causes the appropriate application to
open so that the resource locator may be opened.

15
After the client application 110 receives the play list (step 530), the client application
110 displays advertisements in the client window 200 in accordance with the on-line play list
(step 540). The client application 110 may also display advertisements in the client window
20 200 prior to and during establishment of the communication channel in accordance with a
logon play list, as described in the above-referenced related application.

25
The client application 110 periodically determines whether to obtain a new play list
from the OSP server 130 (step 550). The client application 110 may automatically download
a new play list upon the occurrence of certain events such as after the last advertisement in
the play list has been displayed or at predetermined time intervals. The OSP server 130 may
30 also automatically prompt the client application to obtain a new play list upon the occurrence
of certain events such as after a new, targeted play list is compiled, as described below. If
circumstances warrant obtaining a new play list, then the client application obtains an updated
play list from the OSP server (step 530).

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In any event, the client application 110 continues to display ads in accordance with
the play list while the user uses the online service (step 560).

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The OSP server 130 preferably compiles a separate play list for each user of the online
service. Each user-specific play list contains advertisements that are particularly targeted
toward the corresponding user based upon user-specific characteristics such as the user's
45 demographics and usage history. With reference to Figure 6, the ad targeting capabilities of
the OSP server 130 are described. After the method begins (step 600), the client application
110 establishes a communication channel with the network (step 605). The OSP server 130
conducts a correlation or match between the user and the pool of available advertisements
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(step 610). The advertisement correlation is preferably initially performed whenever the client application 110 establishes a communication channel with the OSP server 130.

The OSP server 130 performs a best fit-analysis between the user and the available advertisements and compiles a list of advertisements that are particularly suited for the user. The best-fit analysis is preferably performed by determining field matches between the Advertiser tables and the User tables in conjunction with a predetermined field priority schedule. A set of best-fit advertisements for the user is then compiled by the OSP server 130.

The OSP server then establishes a play list for the user (step 615) comprised of one or more of the advertisements selected in the best-fit analysis. The order of the advertisements in the play list may be arbitrarily determined. Alternately, the order may be determined according to a priority protocol that is preferably related to the user's usage history with the network. Preferably, advertisements related to subject matter that the user commonly requests or accesses data on are placed at the top of the play list. The play list preferably also includes at least one randomly selected advertisement that may or may not be related to the user's demographic profile to allow for random testing of advertisements with the user. However, the quantity of randomly-selected advertisements is preferably minimized so as not to interfere with the provision of targeted advertisements.

The play list preferably includes several advertisements compiled from the general profile of the user determined over the user's entire history with the online service. However, the play list could also comprise a single advertisement that is specially selected for the user based only upon the user's most-recently monitored activities on the web server 150, including the type of network data the user is requesting during the current online session. For example, if, during the online session, the user is requesting or searching for data relating to automobiles, then the play list preferably comprises an automobile-related advertisement. The advertisement may include a special banner notifying the user that the advertisement was specially selected to assist the user in gathering information during the online session. Preferably, this will bolster the user's confidence in the advertisement display process so that the user has an increased tendency to review the advertisements in the client window 200.

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10 In any event, the OSP server 130 next provides the client application 110 with the new play list (step 620). Preferably, the OSP server prompts the client application 110 to download a play list whenever the play list has been updated. In this manner, the user is regularly provided with an updated, optimized play list.

15 For a given user, the OSP server 130 periodically determines whether to compile an updated play list (step 625). The OSP server 130 may be configured to automatically update the play list upon the occurrence of certain events, such as when the targeting criteria of the advertisement records undergo a change. The OSP server 130 may also be configured to automatically update the play list at predetermined time intervals. The client application 110
20 may also prompt the OSP server 130 to update the play list when the current play list is at or near the last advertisement in the play list.

25 If circumstances warrant that the play list should be updated, then a new play list is formulated based upon a best-fit match between the user and the advertisement records (steps 610 and 615). This process continues until the user logs off of the network (steps 630, 635).

30 Referring now to Figure 7, there is shown a flow chart of a method of dynamically optimizing an advertisement's targeting criteria based upon the performance of the advertisement. After the method begins (step 700), the OSP server 130 accesses the records from the data stores 140 relating to the performance and target criteria for a given advertisement (step 710). The OSP preferably compares the performance records in the Ad
35 Performance table with the target criteria in the Advertisement table to ascertain whether the target criteria should be refined based upon the monitored performance of the advertisement.

40 Based upon this comparison, the OSP server 130 then determines whether to update the target criteria in the Advertisement table for the given advertisement (step 710). The OSP server 130 may use various criteria to determine when to modify an advertisement's target
45 criteria. One such criterion relates to the demographic categories that have performed click-throughs on the advertisement. The OSP server 130 preferably updates the advertisement's target criteria if a predetermined quantity of users of a given demographic category have performed click-throughs on the advertisement and that demographic is not included in the
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advertisement's target criteria (step 720). The Advertisement table is revised to include the non-included demographic category as target criteria.

For example, the comparison between the advertisement performance records and the advertisement target criteria records may indicate that users of an 18-24 year-old age group commonly click-through the advertisement but that age group is not included in the target criteria for the advertisement. The OSP server then updates the Advertiser table to include the 18-24 year-old age group under target criteria. The advertisement is thereafter targeted to 18-24 year-old users.

Another criterion for updating an advertisement's target criteria is the times of day that users perform click-throughs on the advertisement. The performance records of the advertisements may indicate that the advertisement receives a high number of click-throughs at certain hours of the day. The Advertisement table is preferably updated so that the rotation of the associated advertisement is increased during those hours of the day.

The target criteria for a given advertisement is preferably also updated when the corresponding performance records indicate that the advertisement is performing poorly, such as if the advertisement receives little or no click-throughs from the target audience, or if the advertisement receives little or no click-throughs at certain hours of the day. In this case, the OSP server 130 preferably modifies the target criteria of the advertisement to include additional demographic categories that may or may not be related to the current target demographic categories. The OSP server 130 may also modify the display hours of a poorly-performing advertisement to increase its rotation and thereby pique user interest.

The target criteria for each advertisement is preferably regularly modified to at least temporarily include randomly-selected demographic categories. This will allow the advertisement to be periodically displayed to random users, thereby allowing the advertiser to monitor the performance of the advertisement with new audiences and perhaps expand the scope of the advertisement.

The OSP server 130 preferably automatically performs the advertisement targeting optimization method on a regular basis for each advertisement record in the data stores 140.

5 The OSP server 130 may be configured to perform the process at times when online usage is traditionally below peak levels, such as during the middle of the night.

10 In certain circumstances, the OSP server may automatically transmit at least one advertisement to a user's local device 100 for immediate, real time display to a user, rather than for display as part of a play list. Such an advertisement is referred to herein as a "real
15 time advertisement," which is an advertisement that the OSP server 130 automatically transmits to the local device 100 of one or more users for immediate display.

20 Certain advertisements may exhibit such a strong performance with online users of a certain demographic category to warrant sending the advertisement as a real time advertisement to other users of the same or similar demographic category. With reference now to Figure 8, there is shown a flow chart of a method of displaying an advertisement as a
25 real time advertisement to users of a given demographic category if the advertisement exhibits a strong response from other users of the same or similar demographic category.

30 The method begins when a user performs a click-through on an advertisement (the "subject advertisement") (step 810). The OSP server 130 then accesses and examines the performance records for the subject advertisement and ascertains whether the subject advertisement has received a good response from users of the same or similar demographic category or categories as the current user (step 815). Preferably, each demographic category
35 is associated with a set of predetermined demographic categories that are deemed to be similar categories.

40 The criteria for whether an advertisement has received a "good response" from a demographic may vary. Some possible criteria are: the total number of click-throughs on the advertisement by users of that demographic, click-throughs on the advertisement as a percentage of total number of click-throughs on all advertisements, or number of click-throughs within a given time span.
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Based upon the analysis of the subject advertisement's performance records, the OSP server 130 next determines whether the advertisement should be displayed as a real time
50 advertisement to users of the same or similar demographic category as the current user (step

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820). If it is determined that the subject advertisement has received a good response, then the OSP server 130 prompts the client applications 110 of users of the same or similar demographic category to interrupt the respective advertisement play lists (step 825). The subject advertisement is then displayed to the users as a real time advertisement for a predetermined time span (step 830). The subject advertisement may or may not be in the interrupted play lists.

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In lieu of interrupting the users' play lists and displaying the subject advertisement in the regular client window 200, the subject advertisement may be prominently displayed in a separate, specially-reserved window on the display device 101. The separate window is preferably a unique color or shape with respect to the other displayed windows to increase its prominence. The window could include a banner that refers to the strong performance of the advertisement with other, similar users and thereby entices the user to click on the advertisement. For example, the banner could read, "Click here to join the hype" or "Get in on the excitement."

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In any event, the separate window is preferably only used in limited circumstances to preserve the novelty of the window and thereby increase the likelihood of attracting a user's attention. Toward this end, the separate window is preferably used a maximum number of times per week or month for each user and only for a limited time span.

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After the subject advertisement has been displayed for the predetermined time span, the client application 110 continues with the play list of each individual user (step 835). The play list preferably continues from the point at which it was interrupted. The advertisement that was interrupted may be redisplayed for its entire time span allotment. Alternately, the interrupted advertisement may be displayed for the remaining time allotment from the point at which it was interrupted so that the play list is essentially paused while the real time advertisement is displayed. In another alternative, the client application 110 of each user may prompt the OSP server 130 to compile a new, updated play list for the user after the play list has been interrupted. The process is then complete (step 840).

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Strong performance is just one criterion for transmitting an advertisement as a real time advertisement. Other criteria could also be used. For example, the method shown in

Figure 8 could also be used where the subject advertisement is a poorly-performing advertisement in an attempt to increase user interaction with the advertisement. The method is preferably initiated if it is determined that advertisement is performing poorly, such as if the advertisement receives less than a minimum quantity of click-throughs from its target audience.

In the case of poorly-performing advertisements, the subject advertisement is preferably automatically sent to users of randomly-selected demographic categories as well as users of the specified target audience. This allows the advertiser to test the poorly-performing subject advertisement with new audiences and, if necessary, modify the advertisement's target criteria. The subject advertisement could include a special banner or title that entices the user to click on the subject advertisement and preferably increase the subject advertisement's performance with users.

Although exemplary embodiments of the present invention have been shown and described, it will be apparent to those having ordinary skill in the art that a number of changes, modifications, or alterations to the invention as described herein may be made, none of which depart from the spirit of the present invention. All such changes, modifications and alterations should therefore be seen as within the scope of the present invention.

Claims

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CLAIMS

It is claimed

1. A method of selecting advertisements for display to users of an online service, each user using a client application on a local device, each local device comprising an input device and an output device, the local devices accessing the online service and providing interaction with an OSP server associated with the online service, the method comprising:

(a) the client application establishing communication channels from each of the local devices to the online service;

(b) the OSP server transmitting an advertisement to the client application;

(c) the client application causing the advertisement to be displayed on the output device of the local device of a first user, wherein the first user is associated with a demographic category;

(d) the OSP server monitoring whether the first user performs a click-through on the advertisement;

(e) if the first user performs a click-through on the advertisement, the OSP server automatically causing the advertisement to be displayed on the output device of the local device of a second user that is the associated with the same demographic category as the first user.

2. The method of selecting advertisements for display to users of an online service as set forth in Claim 1, further comprising monitoring the quantity of click-throughs that have been performed on the advertisement by users of the demographic category.

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10 3. The method of selecting advertisements for display to users of an online service as set forth in Claim 2, further comprising automatically causing the advertisement to be displayed on the output device of the local device of the second user only if the quantity of click-throughs con the advertisement by users of the demographic category has exceeded a
15 predetermined threshold quantity.

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25 4. The method of selecting advertisements for display to users of an online service as set forth in Claim 1, additionally comprising the OSP server interrupting an advertisement play list of the second user prior to causing the advertisement to be displayed on the output device of the second user.

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35 5. A method of selecting advertisements for display to a user of an online service using a client application on a local device, the local device comprising an input device and an output device, the local device accessing the online service and providing interaction with an OSP server associated with the online service, the method comprising:

40 (a) the client application activating;

45 (b) the client application establishing a communication channel from the local device to the online service;

50 (c) the client application displaying a client window on the output device of the local device;

5 (d) the OSP server accessing advertisement records from a data store, the
advertisement records comprising at least one ad object associated with a given
10 advertisement, each ad object comprising a resource locator and advertisement targeting
criteria;

15 (e) the OSP server accessing a user record comprising user-specific information;

(f) the OSP server comparing the targeting criteria of each ad object with the user-
specific information in the user record and identifying at least one advertisement for display
20 to the user based upon the comparison;

(g) the OSP server compiling an advertisement play list comprised of at least one of
25 the identified ad objects;

(h) the client application causing advertisements to be displayed in an ad pane of the
client window, wherein the display of advertisements operates in accordance with the play
30 list;

(i) the OSP server modifying the targeting criteria of at least one of the ad objects in
the advertisement records based upon the performance of the ad object with users of a given
35 demographic category;

(j) the OSP server re-comparing the targeting criteria of each ad object with the user-
specific information in the user record and identifying at least one advertisement for display
40 to the user based upon the re-comparison;

(k) the OSP server compiling a new advertisement play list comprised of at least one
45 of the identified ad objects; and

(l) the client application causing advertisements to be displayed in an ad pane,
50 wherein the display of advertisements operates in accordance with the new play list.

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6. The method of selecting advertisements for display to a user of an online service as set forth in Claim 5, wherein the OSP server comprises several physical devices which as a group provide the online service.

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7. The method of selecting advertisements for display to a user of an online service as set forth in Claim 5, wherein the play list identifies an order in which the advertisements in the play list are to be played.

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8. The method of selecting advertisements for display to a user of an online service as set forth in Claim 5, additionally comprising monitoring the user's interaction with an advertisement and modifying the targeting criteria of the ad object associated with the advertisement.

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9. The method of selecting advertisements for display to a user of an online service as set forth in Claim 5, wherein the advertisement targeting criteria and the user-specific information comprise the following categories: geographic location, age, occupation, and gender.

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10. A method of selecting advertisements for display to a user of an online service using a client application on a local device, the local device comprising an input device and an output device, the local device accessing the online service and providing interaction with an OSP server associated with the online service, the method comprising:

(a) the OSP server establishing an advertisement record for at least one advertisement, each advertisement record comprising an ad object comprised of a resource locator for the advertisement and data relating to a desired target audience for the advertisement;

(b) the OSP server establishing a user record including data specific to the user, wherein at least a portion of the user-specific data corresponds to the target audience data;

(c) the OSP server comparing the target audience data for each advertisement record with the user-specific data for the user;

(d) the OSP server compiling a best-fit play list of advertisements for display to the user based upon the comparison of the advertisement records and the user-specific data, wherein the play list identifies an order in which the advertisements in the play list are to be played.;

(e) the client application establishing a communication channel from the local device to the online service;

(f) the client application causing advertisements to be displayed in an ad pane of a client window on the display device, wherein the display of advertisements operates in accordance with the play list.

11. The method of selecting advertisements for display to a user of an online service as set forth in Claim 10, further comprising:

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(a) the OSP server modifying the target audience data of at least one of the ad objects;

(b) the OSP server compiling a new play list of advertisements for display to the user;

10 (c) the client application displaying advertisements in an ad pane of a client window on the display device, wherein the display of advertisements operates in accordance with the new play list.

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20 12. The method of selecting advertisements for display to a user of an online service as set forth in Claim 10, further comprising interrupting the display of advertisements of the play list and displaying a single advertisement in the ad pane, wherein the single advertisement is

25 not in the play list.

30 13. The method of selecting advertisements for display to a user of an online service as set forth in Claim 12, further comprising the client application causing advertisements to

35 continue to be displayed in an ad pane of a client window on the display device in accordance with the play list after the single advertisement has been displayed.

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14. The method of selecting advertisements for display to a user of an online service as set forth in Claim 10, wherein the target audience data and the user-specific data comprise data

45 relating to age, gender, geographic location, and marital status.

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16. A method of provisioning advertisements for display to users of an online service using client applications on local devices, each user being associated with at least one demographic category, the local devices each comprising an input device and an output device, the local devices accessing the online service and providing interaction with an OSP server associated with the online service, the method comprising:

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(a) the OSP server establishing an ad object comprised of a resource locator for a given advertisement and data relating to a desired target audience for the given advertisement, the target audience data comprising demographic categories;

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(b) the client device causing the advertisement to be displayed on the output devices of the local devices of the users;

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(c) the OSP server monitoring the users' click-throughs on the advertisement when the advertisement is displayed on the output devices and compiling a list of user demographic categories that have clicked through the advertisement;

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(d) the OSP server determining whether there are any user demographic categories that: (i) have performed a click-through on the advertisement and (ii) are not included in the advertisement's target audience data;

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(e) the OSP server modifying the targeting criteria of the ad object to include any non-included demographic category.

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17. The method of provisioning advertisements for display to users of an online service using client applications on a local devices as set forth in Claim 15, wherein the demographic categories comprise age, geographic location, gender, occupation, and marital status.

17. The method of provisioning advertisements for display to users of an online service using client applications on a local devices as set forth in Claim 15, further comprising:

(a) the OSP server recording the quantity of users from each demographic category that have performed click-throughs on the advertisement; and

(b) the OSP server modifying the targeting criteria of the ad object to include any non-included demographic category only after a predetermined quantity of users from the non-included demographic category have clicked through the advertisement.

18. The method of provisioning advertisements for display to users of an online service using client applications on a local devices as set forth in Claim 17, wherein the demographic categories include age group, geographic location, gender, marital status, and occupation.

19. The method of provisioning advertisements for display to users of an online service using client applications on a local devices as set forth in Claim 15, wherein the advertisement is displayed in accordance with an advertisement play list comprised of at least one ad object, each ad object being associated with a given advertisement.

20. The method of provisioning advertisements for display to users of an online service using client applications on a local devices as set forth in Claim 15, additionally comprising compiling a separate advertisement play list for each user.

21. A system for selecting advertisements for display to users of an online service, the users
utilizing the online service with respective local devices, wherein the local devices display
advertisements from the online service the system comprising a computer program product
comprising a computer usable medium having ad targeting software for causing an OSP
server to:

(a) obtain personal profile information and online usage history information about
plural users;

(b) obtain advertisement provisioning information from plural advertisers;

(c) perform a best-fit match between the personal profile information and the online
usage history information about the plural users and the advertisement provisioning
information for a given advertisement to thereby identify a first group of users for receipt of
the given advertisement;

(d) transmit instructions to the local devices of the first group of users to display the
given advertisement;

(e) monitor performance of the given advertisement, wherein performance of the
given advertisement comprises whether the users of the first group click-through on the given
advertisement;

(f) test if the performance of the given advertisement meets predefined performance
criteria, and if so, then

(1) correlate the personal profile information and the online usage history
information of the users who clicked-through on the given advertisement;

(2) identify a second group of users having personal profile information and

5 online usage history information consistent with the correlated personal profile information
and online usage history information of the users who clicked-through on the given
10 advertisement;

(3) transmit instructions to the local devices of the second group of users to
15 display the given advertisement.

20 22. The system for selecting advertisements for display to users of an online service of
claim 21, the ad targeting software additionally for causing the OSP server to prepare play
lists for each of the users of the first group of users, the play lists comprising an ad object
25 corresponding to the given advertisement, the play lists further comprising ad objects
corresponding to additional advertisements identified in the best-fit match, the ad objects
comprising resource locators for the advertisements' displays; the ad targeting software
30 additionally for causing the OSP server to transmit instructions to the local devices of the
second group of users to display the advertisements of the respective play lists.

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40 23. The system for selecting advertisements for display to users of an online service of
claim 22, the ad targeting software additionally for causing the OSP server to prepare play
lists for each of the users of the second group of users, the play lists comprising ad objects
45 corresponding to the advertisements identified in best-fit matches; the ad targeting software
additionally for causing the OSP server to transmit instructions to the local devices of the
second group of users to display the advertisements of the respective play lists.
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24. The system for selecting advertisements for display to users of an online service of claim 23, the ad targeting software additionally for causing the OSP server to transmit instructions to the local devices of the second group of users to interrupt the respective play lists of the second group of users and display the given advertisement.

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25. The system for selecting advertisements for display to users of an online service of claim 23, the ad targeting software additionally for causing the OSP server to include the given advertisement in the respective play lists of the second group of users.

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26. The system for selecting advertisements for display to users of an online service of claim 21, wherein the online usage history information comprises psychographic qualities of the user based upon subject matter that the user has requested from the online service.

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27. The system for selecting advertisements for display to users of an online service of claim 21, wherein the personal profile information comprises demographic and geographic qualities of the user.

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28. The system for selecting advertisements for display to users of an online service of
claim 21, the ad targeting software additionally for causing the OSP server to transmit
10 instructions to the local devices of the second group of users to display the given
advertisement without delay.

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29. The system for selecting advertisements for display to users of an online service of
claim 21, wherein the predefined performance criteria comprises a predetermined number of
20 users of the first group of users clicking-through on the given advertisement.

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30. The system for selecting advertisements for display to users of an online service of
claim 21, the play lists further including a resource locator for click-through.
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31. The system for selecting advertisements for display to users of an online service of
claim 21, further including client applications operative on the local devices and responsive to
instructions from the OSP server.
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32. A system for selecting advertisements for display to users of an online service, the users
utilizing the online service with respective local devices, the system comprising a computer
program product comprising a computer usable medium having ad targeting software for
50 causing an OSP server to:

5 (a) obtain personal profile information and online usage history information about plural users;

10 (b) obtain advertisement provisioning information from plural advertisers, wherein each advertisement has associated therewith an ad object, the ad object comprising a resource locator for the display of the advertisement;

15 (c) perform a best-fit match between the personal profile information and the online usage history information about the plural users and the advertisement provisioning information for plural advertisements,

20 (d) based upon the best-fit match, prepare a play list for each user, the play list for a given user comprising the ad objects associated with the matched advertisements for the given user;

25 (e) transmit the play list for each user to the local device of that user for display of the advertisements referenced in the play list by the local device;

30 (f) monitor performance of a given advertisement, wherein performance of the given advertisement comprises whether the users having the given advertisement in their play list click-through on the given advertisement;

35 (g) test if the performance of the given advertisement meets predefined performance criteria, and if so, then

40 (1) correlate the personal profile information and the online usage history information of the users who clicked-through on the given advertisement;

45 (2) identify a first group of users having personal profile information and online usage history information consistent with the correlated personal profile information and online usage history information of the users who clicked-through on the given

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advertisement;

(3) prepare play lists for the first group of users including the ad object of the given advertisement.

33. The system for selecting advertisements for display to users of an online service of claim 32, the ad targeting software further for causing the OSP server to include only the ad object of the given advertisement in the play lists.

34. The system for selecting advertisements for display to users of an online service of claim 32, the ad targeting software further for causing the OSP server to include ad objects for other advertisements in addition to the given advertisement in the play lists.

35. The system for selecting advertisements for display to users of an online service of claim 34, wherein the other advertisements are selected for each user of the first group of users on an individual basis.

36. The system for selecting advertisements for display to users of an online service of claim 32, wherein the predefined performance criteria comprises a predetermined number of users clicking-through on the given advertisement.

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37. The system for selecting advertisements for display to users of an online service of claim 32, the play lists further including a resource locator for click-through.

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38. The system for selecting advertisements for display to users of an online service of claim 32, further including client applications operative on the local devices and responsive to instructions from the OSP server.

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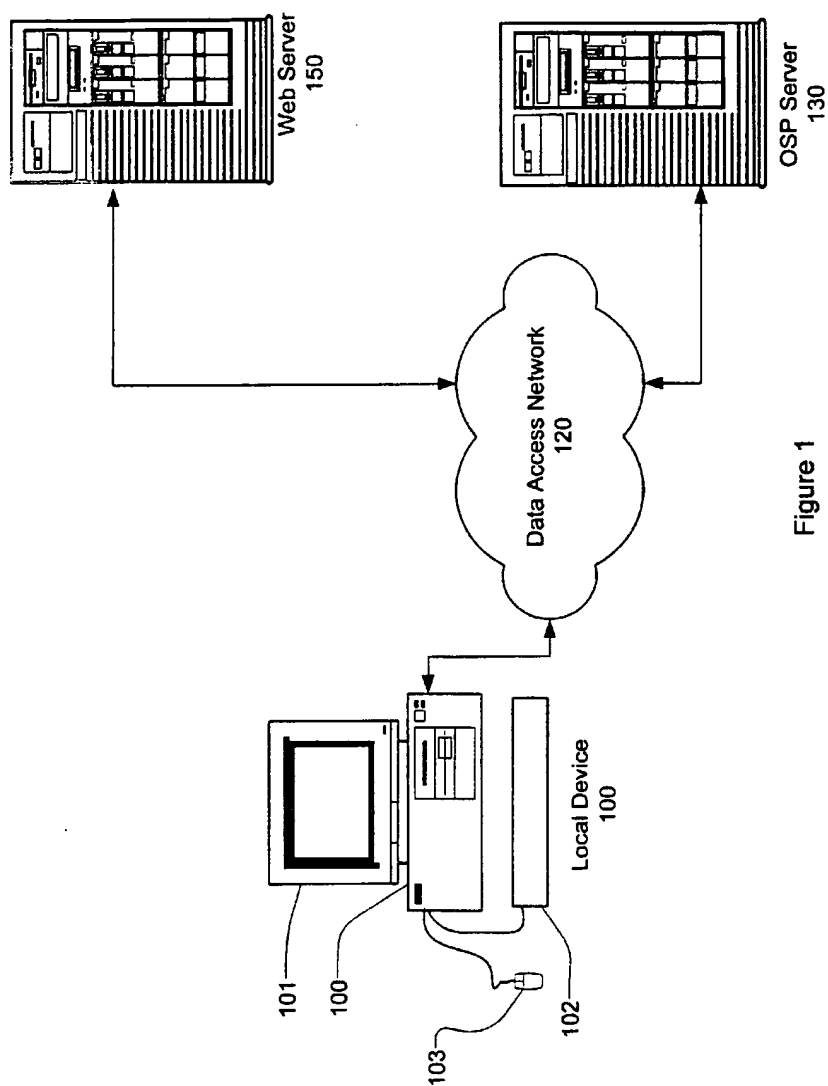


Figure 1

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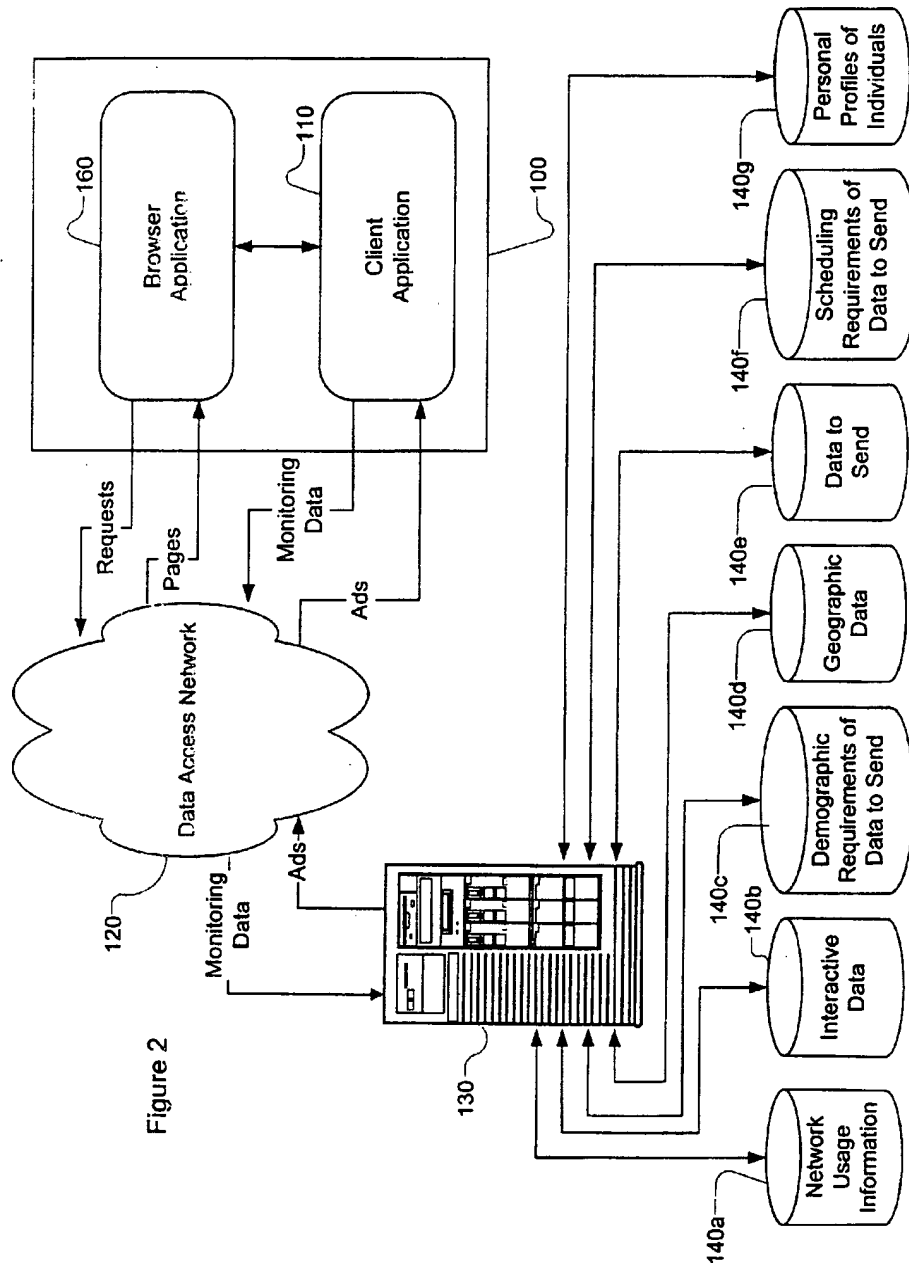
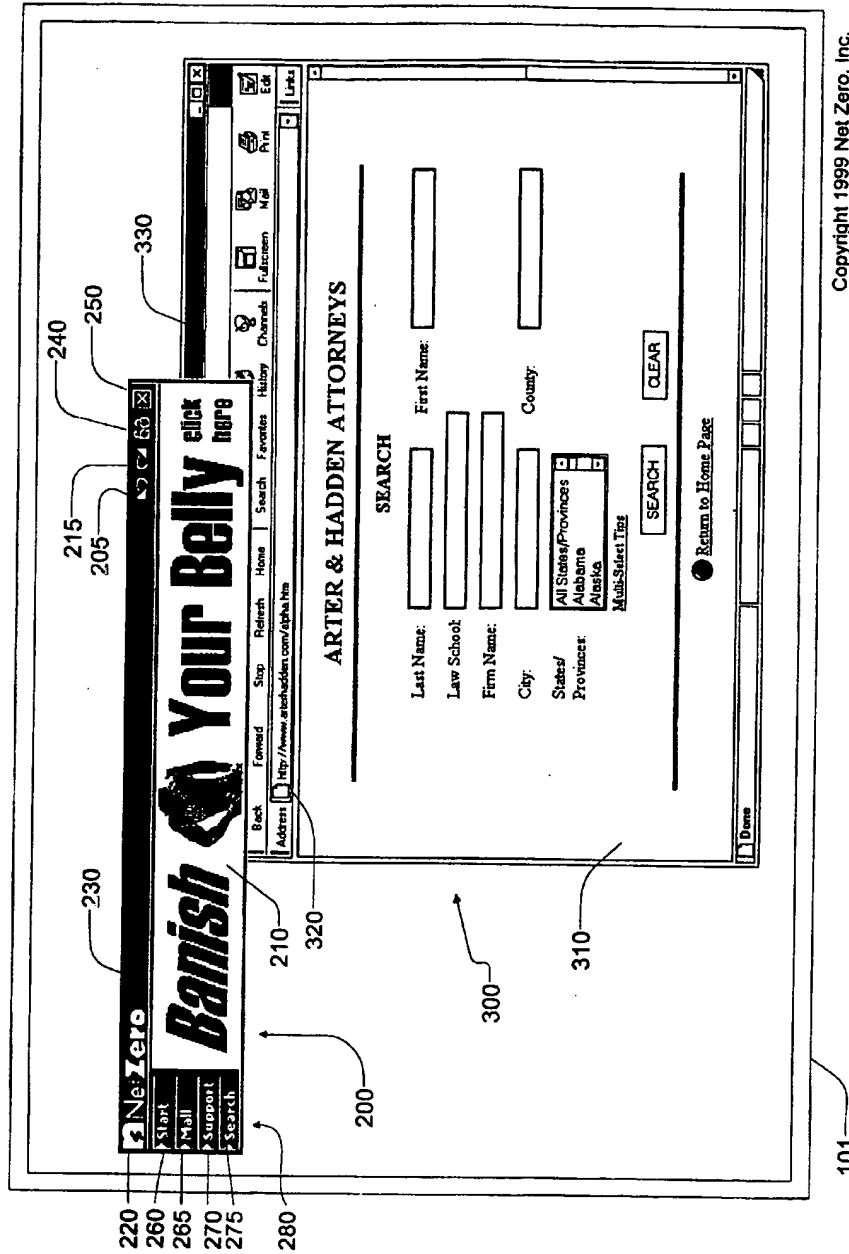


Figure 2

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Figure 3

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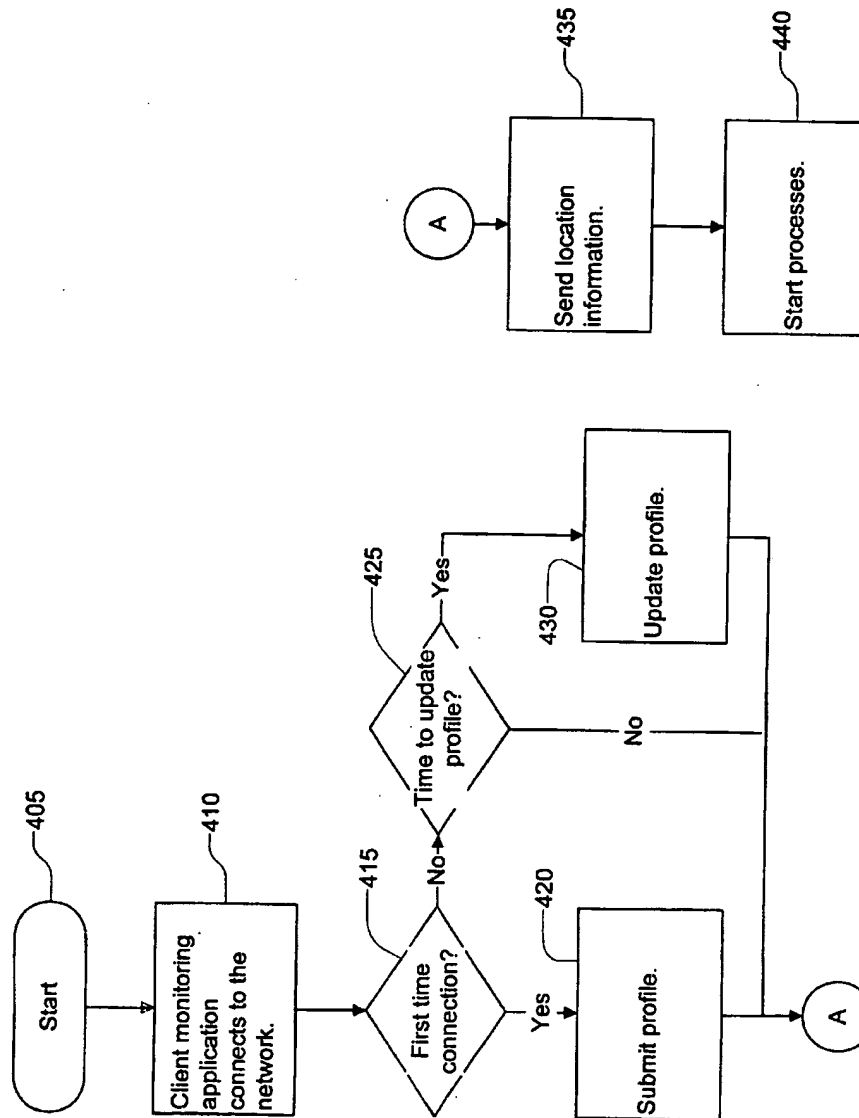


Figure 4

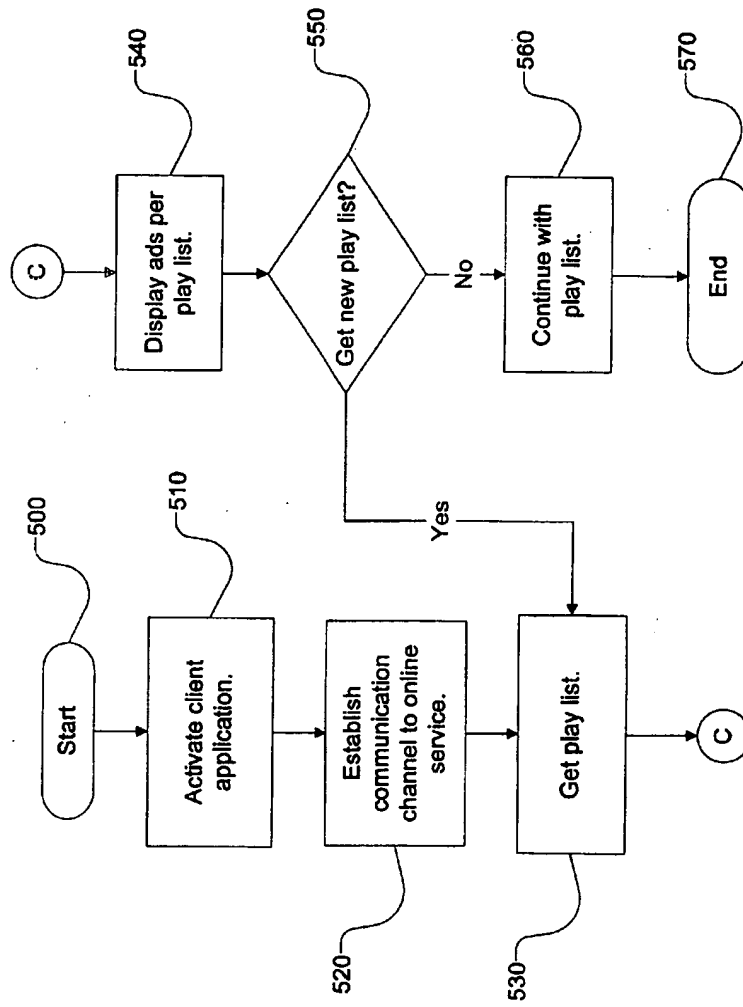


Figure 5

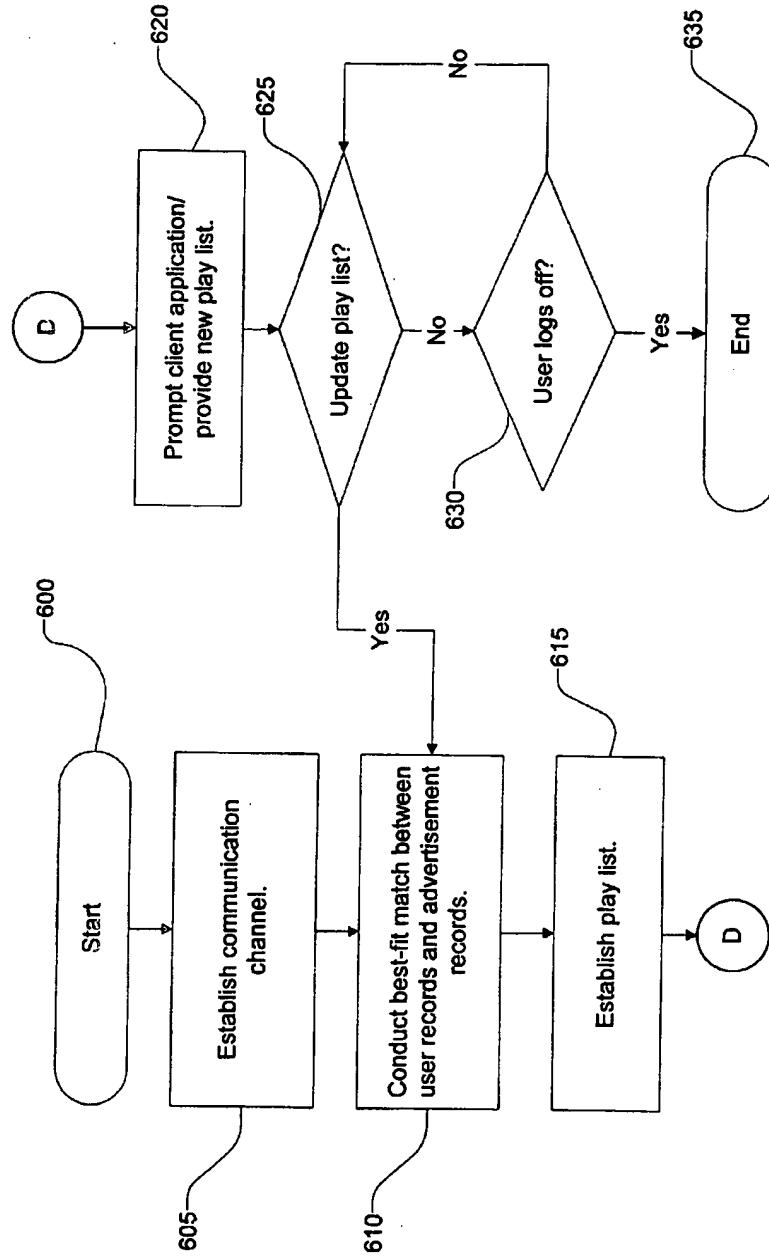


Figure 6

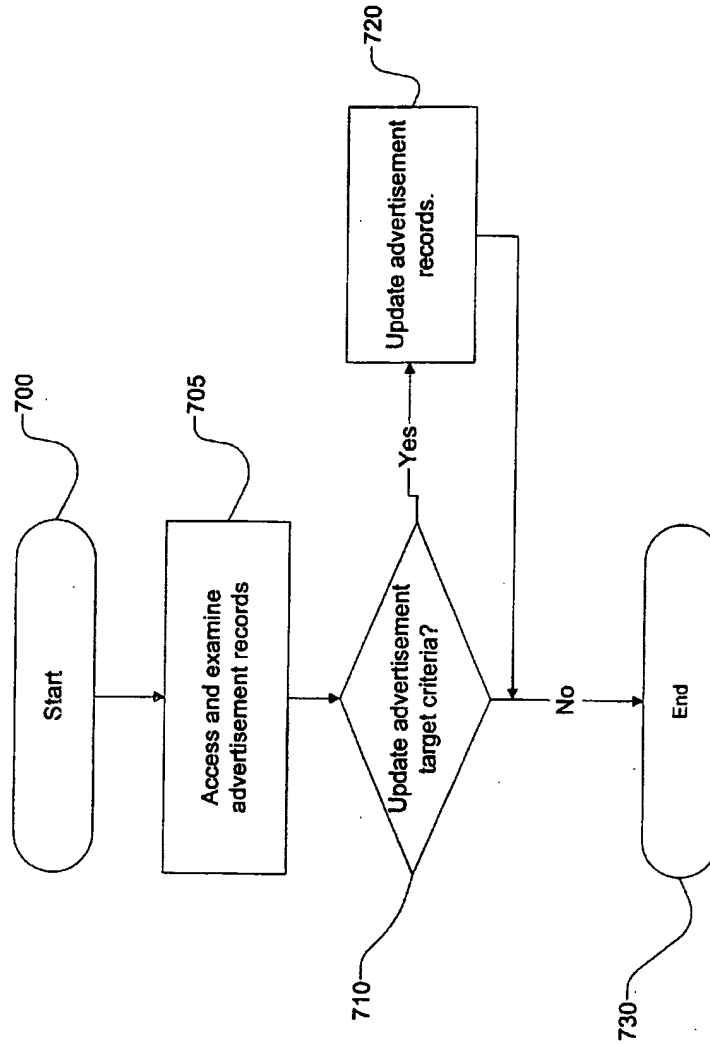


Figure 7

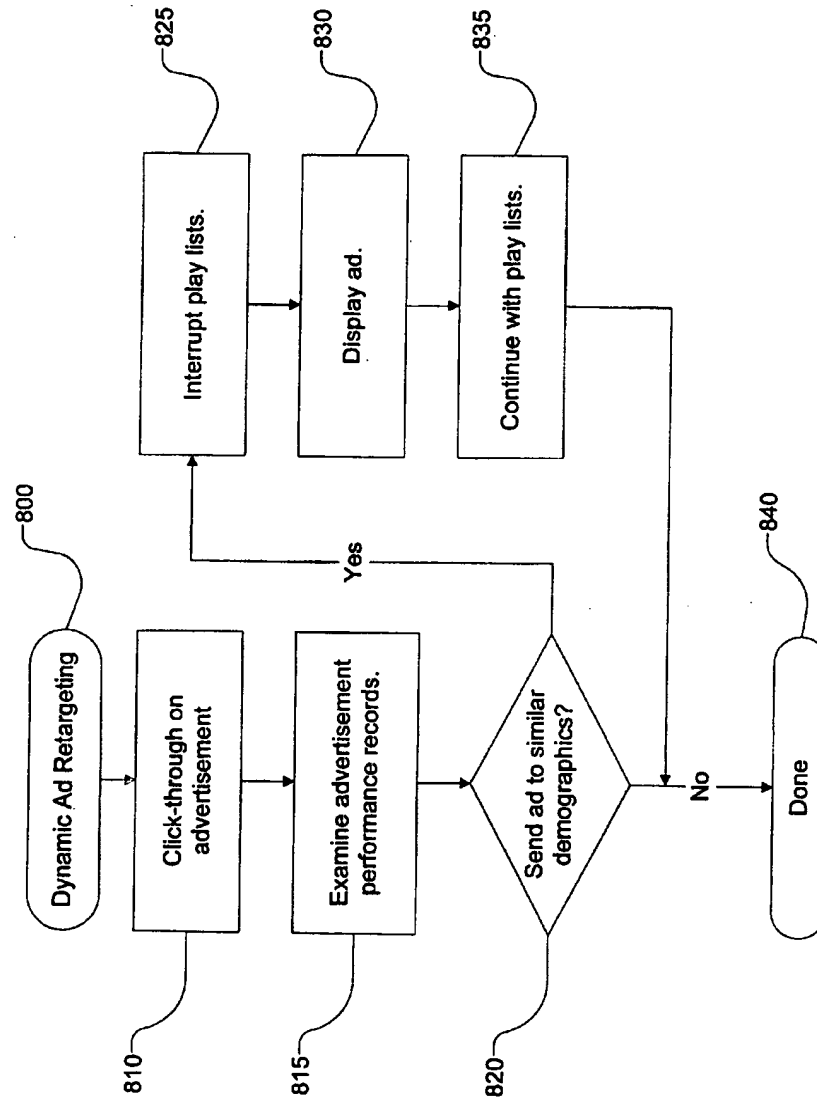


Figure 8